

CLAIM AMENDMENTS

1. (Currently Amended) A hearing aid, comprising:
~~an input signal channel having~~ a microphone ~~and for providing a~~ digital input signals;
a signal path having an input for receiving said digital input signal and an output for
conveying a digital output signal, said signal path adapted to process said digital input signals in
accordance with a hearing impairment correction signal processing algorithm to produce a said
digital output signal, wherein said signal path further comprises at least one signal processing
function operating on a warped frequency scale; and
~~an output conversion means~~ a transducer adapted to convert said output signals to an audio
output.
2. (Original) The hearing aid of claim 1, wherein said at least one signal processing function
further comprises a plurality of cascaded all-pass filters.
3. (Original) The hearing aid of claim 1, wherein said warped frequency scale approximates
a Bark scale.
- 4-29. (Cancelled)
30. (Original) A hearing aid, comprising:
an input signal channel providing digital input signals;
an input data buffer, said input data buffer holding a block of data of size M comprised of a
portion of said digital input signals;
a plurality of cascaded all-pass filters comprised of 2M cascaded all-pass filters, wherein a
first block of said digital input signals pass from said input data buffer through said plurality of
cascaded all-pass filters to form a first sequence of delayed samples and wherein a second block of

said digital input signals pass from said input data buffer through said plurality of cascaded all-pass filters to form a second sequence of delayed samples, and wherein said first sequence of delayed samples and said second sequence of delayed samples form a combined sequence of delayed samples;

means for windowing a first portion of said combined sequence of delayed samples, wherein said first portion is of size M , wherein a windowed sequence of delayed samples results from said windowing means;

means for applying a $2M$ -point frequency domain transform on said windowed sequence of delayed samples, wherein a warped sequence results from said frequency domain transform applying means;

means for calculating a plurality of frequency domain level estimates of said warped sequence;

means for calculating a plurality of frequency domain gain coefficients from said plurality of frequency domain level estimates;

means for applying an inverse frequency domain transform on said plurality of frequency domain gain coefficients, wherein a set of compression filter coefficients of a compression gain filter result from said inverse frequency domain transform applying means; and

means for convolving a second portion of said combined sequence of delayed samples with said compression filter coefficients, wherein said second portion is of size M , wherein a digital output signal results from said convolving means.

31. (Previously Presented) The hearing aid of claim 30, further comprising a hearing aid, wherein the dynamic range compressor is incorporated within said hearing aid.

32. (Previously Presented) The hearing aid of claim 30, wherein said plurality of frequency domain gain coefficients comprise a warped time-domain filter.

33. (Previously Presented) The hearing aid of claim 30, further comprising a digital-to-analog converter, said digital-to-analog converter converting said digital output signals to analog output signals.

34. (Previously Presented) The hearing aid of claim 33, further comprising an output transducer, said output transducer converting said analog output signals to an audio output.

35. (Previously Presented) The hearing aid of claim 30, said plurality of cascaded all-pass filters comprising a plurality of first order all-pass filters.

36. (Previously Presented) The hearing aid of claim 30, further comprising a digital processor, wherein said digital processor is adapted to provide said windowing means, said means for applying said 2M-point frequency domain transform, said means for calculating said plurality of frequency domain level estimates, said frequency domain gain coefficients calculating means, said inverse frequency domain transform applying means, and said convolving means.

37. (Previously Presented) The hearing aid of claim 30, wherein said means for applying said frequency domain transform uses a transform selected from the group consisting of discrete Fourier transforms, fast Fourier transforms, Goertzel transforms, and discrete cosine transforms.

38. (Previously Presented) The hearing aid of claim 30, further comprising:
an input transducer, said input transducer converting audio input signals to analog input signals; and

an analog-to-digital converter, said analog-to-digital converter converting said analog input signals to said digital input signals.

39. (Previously Presented) The hearing aid of claim 30, further comprising:

a digital-to-analog converter, said digital-to-analog converter converting said digital output signals to analog output signals; and

an output transducer, said output transducer converting said analog output signals to an audio output.

40. (Original) A method of processing sound in a hearing aid, comprising the steps of:

receiving digital input signals;

passing a portion of said digital input signals through a plurality of cascaded all-pass filters to form a sequence of delayed samples;

windowing said sequence of delayed samples;

applying a frequency domain transform to said windowed sequence of delayed samples to form a warped sequence;

calculating a plurality of frequency domain level estimates from said warped sequence;

calculating a plurality of frequency domain gain coefficients from said plurality of frequency domain level estimates to form a warped time domain filter;

applying an inverse frequency domain transform on said plurality of frequency domain gain coefficients to form a set of compression filter coefficients; and

convolving said sequence of delayed samples with said compression filter coefficients to form a digital output signal.

41. (Previously Presented) The hearing aid of claim 1, wherein the hearing aid is configured to be mounted on the ear of a user.

42. (Previously Presented) The hearing aid of claim 1, wherein the hearing aid is an in-the-canal hearing aid.

43. (Previously Presented) The hearing aid of claim 1, wherein the hearing aid is an in-the-ear hearing aid.

44. (Previously Presented) The hearing aid of claim 1, wherein the hearing aid is a behind-the-ear hearing aid.

45. (New) A hearing aid for correcting a hearing impairment of a user, comprising:
an input signal channel having a microphone and providing digital input signals;
a plurality of cascaded all-pass filters, wherein said digital input signals pass through said plurality of cascaded all-pass filters, and wherein said plurality of cascaded all-pass filters output a sequence of delayed samples; and
at least one processor configured for calculating a plurality of frequency domain level estimates from said delayed samples, calculating a plurality of compression filter gain coefficients from said frequency domain level estimates, and convolving said sequence of delayed samples with said plurality of compression filter gain coefficients to produce a digital output signal.

46. (New) The hearing aid of claim 45, further comprising a transducer adapted to convert said digital output signal to an audio output.

47. (New) The hearing aid of claim 45, wherein said plurality of cascaded all-pass filters comprises a plurality of first order all-pass filters.

48. (New) The hearing aid of claim 45, wherein said at least one processor comprises a digital processor.

49. (New) The hearing aid of claim 45, wherein said at least one processor is configured for applying a frequency domain transform on said sequence of delayed samples to create a warped sequence, and calculating said plurality of frequency domain level estimates from said warped sequence.

50. (New) The hearing aid of claim 49, wherein said at least one processor is configured for windowing said sequence of delayed samples to create a windowed sequence of delayed samples, and applying said frequency domain transform to said windowed sequence of delayed samples to create said warped sequence.

51. (New) The hearing aid of claim 45, wherein said at least one processor is configured for calculating a plurality of frequency domain gain coefficients from said plurality of frequency domain level estimates, and calculating said plurality of compression filter gain coefficients from said frequency domain level estimates.

52. (New) The hearing aid of claim 51, wherein said at least one processor is configured for applying an inverse frequency domain transform on said plurality of frequency domain gain coefficients to create said plurality of compression filter gain coefficients.

53. (New) The hearing aid of claim 45, wherein said at least one processor is configured for selecting a first portion of said sequence of delayed samples, calculating a first plurality of frequency domain level estimates of said first sequence of delayed samples, selecting a second portion of said first sequence of delayed samples, calculating a second plurality of frequency domain level estimates of said second sequence of delayed samples, calculating a plurality of frequency domain gain

coefficients from said first and second plurality of frequency domain level estimates, and calculating said plurality of compression filter gain coefficients from said frequency domain gain coefficients.

54. (New) The hearing aid of claim 53, wherein said at least one processor is configured for selecting said first and second sequences of delayed samples, at least in part, by respectively windowing said first and second portions of said first sequence of delayed samples.

55. (New) The hearing aid of claim 53, wherein said at least one processor is configured for calculating said first and second pluralities of frequency domain level estimates, at least in part, by respectively applying first and second frequency domain transforms on said first and second portions of delayed samples.

56. (New) The hearing aid of claim 45, further comprising an input data buffer configured for holding a block of data comprising a portion of said digital input signals, wherein said block of data passes from said input data buffer through said cascaded all-pass filters to form said sequence of delayed samples.

57. (New) The hearing aid of claim 56, wherein said block of data has a size M , said plurality of cascaded all-pass filters has $2M$ cascaded all-pass filters, wherein a first block of said digital input signals passes from said input data buffer through said plurality of cascaded all-pass filters to form a first sequence of delayed samples, wherein a second block of said digital input signals pass from said input data buffer through said plurality of cascaded all-pass filters to form a second sequence of delayed samples, and said first sequence of delayed samples and said second sequence of delayed samples form a combined sequence of delayed samples, wherein said at least one processor is configured for selecting a first portion of said combined sequence of delayed samples, wherein each of said first and second portion is of size M , wherein said plurality of frequency domain level

estimates are calculated from said first portion, wherein said second portion is convolved with said set of time-domain filter coefficients to produce said digital output signal.

58. (New) The hearing aid of claim 57, wherein said at least one processor is configured for windowing said first portion of said combined sequence of delayed samples to create a windowed sequence of delayed samples, and applying a 2M-point frequency domain transform on said windowed sequence of delayed samples to create a warped sequence, wherein said plurality of frequency domain level estimates is of said warped sequence.

59. (New) The hearing aid of claim 30, wherein the hearing aid is configured to be mounted on the ear of a user.

60. (New) The hearing aid of claim 30, wherein the hearing aid is an in-the-canal hearing aid.

61. (New) The hearing aid of claim 30, wherein the hearing aid is an in-the-ear hearing aid.

62. (New) The hearing aid of claim 30, wherein the hearing aid is a behind-the-ear hearing aid.

63. (New) The hearing aid of claim 45, wherein the hearing aid is configured to be mounted on the ear of a user.

64. (New) The hearing aid of claim 45, wherein the hearing aid is an in-the-canal hearing aid.

65. (New) The hearing aid of claim 45, wherein the hearing aid is an in-the-ear hearing aid.

66. (New) The hearing aid of claim 45, wherein the hearing aid is a behind-the-ear hearing aid.